

DISCUSSION OF THE AMENDMENT

Claims 1-18 are active in the present application. Claims 14-18 are new claims. Support for new Claim 14 is found in the last paragraph on page 9. Support for new Claims 15 and 16 is found in the first full paragraph on page 10. Support for new Claim 17 is found on page 12, lines 9-14 and page 1, last sentence. Support for new Claim 18 is found in the Figures and on page 8, last paragraph; page 10, second paragraph last sentence. Independent Claim 1 has been amended to state that the method is carried out in a manner such that the film removal process, the heating/removal process, the polishing process and the cleaning process are carried out in a certain sequence.

No new matter is believed to have been added by this amendment.

REMARKS

Applicants have claimed a method for reclaiming silicon wafers that includes removing a film on a wafer, carrying out heating/removing on the wafer, polishing the wafer and cleaning the wafer. The heating/removal process (e.g., step) of present Claim 1 is carried out at a temperature range of 150-300°C. Applicants disclosed in the specification as originally filed that this temperature range is an important feature of the invention. If the temperature is higher than 300°C, oxygen donors may form in the silicon wafer and thereby affect the quality of the wafer as reflected in, e.g., the specific resistance of the wafer (see new dependent Claim 14 which states that no oxygen donors are formed during the heating/removing process).

Applicants have shown by example that the 150-300°C temperature range recited in the presently claimed invention provides a silicon wafer having substantially improved resistance stability as measured by the rate of change of the specific resistance. Figure 1 shows that at temperatures higher than 300°C, the rate of change of specific resistance increases dramatically. Applicants draw the Office's attention to new dependent Claim 16 which states that the maximum temperature of the claimed method is 300°C. Applicants further draw the Office's attention to new dependent Claim 15 which states that the heating/removal is carried out in air. New dependent Claim 18 states that the process is carried out in a manner such that the specific resistivity of a P-type or N-type silicon wafer is not varied.

Applicants submit that it is readily recognized by those of skill in the art that a silicon wafer having a rate of change of specific resistance as low as possible is a desirable. A low rate of change of specific resistance indicates that the silicon wafer is not undergoing chemical and/or physical changes that might affect its electric properties.

New dependent Claim 18 requires the heating/removal to be carried out so that the specific resistance of a P-type or N-type silicon wafer is not varied. The original specification discloses the following in this regard:

In the present invention, a range of heating temperature for outer diffusion of Cu are penetrated inside of a silicon wafer, while avoiding formation of oxygen donors (namely, avoiding varying of specific resistance of a P-type/N-type silicon wafer), which determines no less than 150°C, and no more than 300°C.

See the last full paragraph on page 9 of the specification.

The Office rejected the present claims in view of Lawrence (U.S. 3,923,567) in combination with Falster (U.S. 6,100,167). The Office concedes that Lawrence does not teach the 150-300°C temperature range for the heating/removal recited in the present claims. The Office relies on Falster to remedy this deficiency.

The Office cites to column 6, lines 6-33 as evidence that Lawrence discloses a heating/removal process. A portion of this disclosure is reproduced below for convenience (underlining added):

In order to remove most of the contaminants 20, a gettering step is thereafter performed. In this step, the wafer boat 12 containing the stripped wafers is slowly moved through a furnace having a temperature in the range between 850°C and 1150°C. Preferably a temperature of 1040°C ± 50°C is used. When the temperature of the wafer is approximately that of the furnace, a phosphorus impurity is carried in a gas stream to the wafers, whereupon the phosphorus is diffused into the surfaces of the wafer.

Not only is Lawrence silent to a heating/removal process carried out at a temperature of 150-300°C, the prior art states that the temperature must be between 850-1,150°C. This temperature is an important condition of the Lawrence process. Such a high temperature is used so that the Lawrence process may diffuse phosphorus into the prior art silicon.

Applicants submit that the heating step of Lawrence is directly contradictory to the heating/removal of the presently claimed invention. In Lawrence, a contaminant, i.e.,

phosphorus, is added to the silicon wafer. Adding a material such as phosphorus to a silicon wafer is directly contradictory to purifying, reclaiming and/or recycling a silicon wafer (e.g., note that the claimed method is one of reclaiming silicon wafers). The heating step of Lawrence makes the prior art silicon wafer less pure and less amenable to use in generic electronic applications at least because it results in the addition of phosphorus to the prior art silicon.

Importantly, it is readily recognized by those of ordinary skill in the art that phosphorus is a P-type dopant. Lawrence, by adding phosphorus in the heating step, necessarily changes the specific resistance of the prior art silicon wafer. This is in contravention of the limitation of new dependent Claims 114, 17 and 18 which each place limits on the types of changes that may affect the silicon wafer, e.g., no variance of the specific resistance of a P-type or N-type silicon wafer). By adding a P-type dopant to the prior art silicon wafer, the specific resistance of any of a P-type or N-type silicon wafer would inherently be changed.

Gettering, i.e., diffusing phosphorus into the prior art silicon wafer, is an essential step of the prior art disclosure. Applicants submit that the prior art gettering process can not render the presently claimed invention obvious at least because the prior art relied upon by the Office necessarily causes an effect, i.e., a change in specific resistance, that is prohibited by the presently claimed subject matter.

Applicants thus submit that the present claims are not obvious in view of Lawrence in combination with any prior art of record and request withdrawal of the rejection.

Applicants submit that the Office's rejection of the claims under 35 U.S.C. § 112, second paragraph is not supportable and should be withdrawn. For example, it is within the knowledge of anyone with even a rudimentary understanding of chemistry that an ammonium base is an alkali, e.g., ammonium hydroxide is a base and an alkali. Thus the term "alkali"

refers not only to alkali metal hydroxides but other alkali hydroxides. Applicants submit that the term "alkali" in the claims of the present application is not confusing to one of ordinary skill in the art. Applicants again direct the Office to the chemical dictionary definition for this term submitted with the Amendment on April 19, 2006. The claims are amended herein to replace the term alkali with alkaline.

For the reasons discussed above, Applicants submit that all now-pending claims are in condition for allowance and request withdrawal of the rejections.

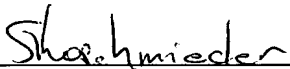
Respectfully submitted,

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